DENIZ BILMAN — CV

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RESEARCH INTERESTS

Nonlinear waves, integrable systems and their perturbations, Riemann-Hilbert problems, dispersive PDEs

APPOINTMENTS

University of Cincinnati, Department of Mathematical Sciences
Assistant Professor — 08/2019–present

University of Michigan, Department of Mathematics
Postdoctoral Assistant Professor. Research mentor: Peter D. Miller — 09/2015–08/2019

EDUCATION AND TRAINING

University of Illinois at Chicago
Ph.D. in Mathematics. Thesis advisor: Irina Nenciu — 08/2015
Thesis title: *On Long-Time Asymptotics for the Toda Lattice and Its Hamiltonian Perturbations*

Boğaziçi University, Istanbul, Turkey
B.S. & M.S. in Mathematics. M.S. Thesis advisors: O. Alp Eden and T. Burak Gürel — 06/2009
M.S. Thesis title: *On Special Solutions of the Zakharov-Schulman System*

ARTICLES IN PREPARATION

- D. Bilman and R. Jenkins. Large-time development of initial data with spectral singularities
- D. Bilman and T. Trogdon. On numerical inverse scattering for the Korteweg-de Vries equation with discontinuous step-like data II: Large-time
- D. Bilman. A special solution of the nonlinear Schrödinger equation: Rogue wave of infinite order
- D. Bilman, L. Ling, P. D. Miller, and A. Tovbis. High-order fundamental rogue waves in the far-field limit

SUBMITTED OR ACCEPTED PUBLICATIONS

- D. Bilman, R. Buckingham, and D. Wang, "Far-field asymptotics for multiple-pole solitons in the large-order limit," *preprint*, 2019.
arXiv:1911.04327, 38 pages
- D. Bilman and T. Trogdon, "On numerical inverse scattering for the Korteweg-de Vries equation with discontinuous step-like data," *accepted for publication in* **Nonlinearity**, 2019.
arXiv:1809.09263, 56 pages
- D. Bilman and R. Buckingham, "Large-order asymptotics for multiple-pole solitons of the focusing nonlinear Schrödinger equation," **Journal of Nonlinear Science**, **29** no. 5, 2185–2229, 2019.
DOI:10.1007/s00332-019-09542-7, 45 pages
- D. Bilman, L. Ling and P. D. Miller, "Extreme superposition: rogue waves of infinite order and the Painlevé-III hierarchy," **Duke Mathematical Journal**, 2018.
DOI:10.1215/00127094-2019-0066, 90 pages
- D. Bilman and P. D. Miller, "A robust inverse scattering transform for the focusing nonlinear Schrödinger equation," **Communications on Pure and Applied Mathematics**, **72** no. 8, 1722–1805, 2019.
DOI:10.1002/cpa.21819, 84 pages
- D. Bilman and T. Trogdon, "Benchmarking numerical methods for lattice equations with the Toda lattice," **Applied Numerical Mathematics**, **141**, 19–35, 2017.
DOI:10.1016/j.apnum.2018.09.020, 16 pages

- D. Bilman and S. Konstantinou-Rizos, "Discrete integrable systems, Darboux transformations, and Yang-Baxter maps," *Symmetries and Integrability of Difference Equations*, **CRM Series in Mathematical Physics**, Springer, 2017. DOI:10.1007/978-3-319-56666-5_5, 54 pages
- D. Bilman and T. Trogdon, "Numerical inverse scattering for the Toda lattice," **Communications in Mathematical Physics**, **352** no. 2, 805–879, 2017. DOI:110.1007/s00220-016-2819-0, 75 pages
- D. Bilman and I. Nenciu, "On the evolution of scattering data under perturbations of the Toda lattice." **Physica D**, **330**, 1–16, 2016. DOI:10.1016/j.physd.2016.03.017, 16 pages

Awards, Grants, and Honors

- Taft Faculty Summer Research Fellowship ($8,000), University of Cincinnati, Summer 2020
- Honored Instructor Award, University Michigan, 2019
  Nominated and chosen by students "for having an impact on their lives and academic careers."
- AMS-Simons Travel Grant ($4,000), 2017–2019
- The B. Alan Taylor Award, University of Michigan, 2017
  Given by the Department of Mathematics "for excellence in teaching, mentoring, and research."
- Early Career Travel Award, SIAM, 2015
  Given by SIAM to attend the SIAM OPSFA International Symposium.
- Graduate Research Scholarship, The Scientific and Technological Research Council of Turkey, 2007–2009
- Best Diploma Thesis Recognition, Department of Mathematics, Boğaziçi University, 2007

Software

Contributor of the `ISTPackage`, since 2015. https://bitbucket.org/trogdon/istpackage

Student Mentoring

Xiaoen Zhang, graduate student co-mentored with Peter D. Miller, University of Michigan, 2018–2019.

Presentations

36. The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan, June 5–9, 2020
35. SIAM Nonlinear Waves and Coherent Structures, Bremen, Germany, July 27–30, 2020
34. The Nonlinear Dispersive Partial Differential Equations and Inverse Scattering Workshop, Fields Institute, Toronto, Canada, May 21–25, 2019
33. 11th IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena, Special Session on Nonlinear Waves, Athens, GA, April 17–21, 2019
32. Departmental Seminar, Colorado State University, April 1, 2019
31. Departmental Colloquium, DePaul University, January 29, 2019
30. Departmental Colloquium, University of Cincinnati, January 24, 2019
29. Integrable Systems and Random Matrix Theory Seminar, University of Michigan, November 19, 2018
28. Applied Mathematics Seminar, University of Washington, November 8, 2018
27. The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan, July 5–9, 2018
26. Analysis and PDE Seminar, University of Kentucky, April 2, 2018
25. Departmental Colloquium, University of Wyoming, March 2018
24. Departmental Colloquium, Bucknell University, March 2018
23. Departmental Colloquium, Wake Forest University, February 2018
22. Analysis Seminar, University of Virginia Commonwealth, December 1, 2017
21. Applied and Interdisciplinary Mathematics Seminar, University of Michigan, September 29, 2017
20. 79/80th Anniversary Midwest PDE Seminar, University of Illinois at Chicago, September 14–17, 2017
19. Focus Program on Nonlinear Dispersive Partial Differential Equations and Inverse Scattering, Fields Institute, Toronto, Canada, August 1–18, 2017

18. Tenth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena, Special Session on Asymptotics and Applied Analysis, Athens, GA, March 29–April 1, 2017
17. Applied and Computational Mathematics Seminar, UC Irvine, LA, November 7, 2016
16. Integrable Systems and Random Matrix Theory Seminar, University of Michigan, October 2016
15. AMS Fall Sectional Meeting, Special Session on Geometric Flows, Integrable Systems and Moving Frames, University of St. Thomas, October 28, 2016
14. *Series of lectures* at the Abecedarian of Symmetries and Integrability of Difference Equations Summer School, Université de Montréal, Montréal, Québec, Canada, July 2016
13. International Conference on Nonlinear Waves: Theory and Applications, Tsinghua University, Beijing, China, June 2016
12. 13th SIAM International Symposium on Orthogonal Polynomials, Special Functions and Applications (SIAM-OPSFA), National Institute for Standards and Technology, Gaithersburg, MD, June 2015
11. Chicago Area SIAM Student Conference, Illinois Institute of Technology, Chicago, April 2015
10. AMS Spring Sectional Meeting, East Lansing, MI, March 2015
9. Graduate Analysis Seminar, University of Illinois at Chicago, Chicago, November 2014
8. Partial Differential Equations Seminar, Drexel University, October 2014
7. AMS Fall Sectional Meeting, San Francisco, CA, October 2014
6. Recent Advances in PDEs and Fluids Workshop, Stanford University, August 2013
5. CNA Summer School: Topics in Nonlinear PDEs and Calculus of Variations, and Applications in Materials Science, Carnegie Mellon University, May 2013
4. Graduate Student Colloquium, University of Illinois at Chicago, March 2013
3. Partial Differential Equations Seminar, University of Illinois at Chicago, September 2012
2. Annual SIAM Chapter Meeting, University of Illinois at Chicago, April 2012
1. 69th Midwest PDEs Conference, University of Illinois at Chicago, April 2012

Outreach and Expository Lectures

What Are Solitons?, Lecture in the Undergraduate Math Club, University of Michigan, Fall 2016

Peer Review

Communications in Mathematical Physics
Studies in Applied Mathematics
Nonlinearity
Physica D
Journal of Computational Physics
SIAM Journal of Mathematical Analysis
European Journal of Physics Plus
Zeitschrift für Angewandte Mathematik un Physik (ZAMP)
AMS Mathematical Reviews (4 articles, 1 book)

Departmental Service

University of Cincinnati
Partial Differential Exams Doctoral Exam Committee, 2019–2020
University of Michigan
Development of MATH 215 - Calculus 3 lab-work, 2017 and 2018
University of Illinois at Chicago
Graduate Student Mentor, 2014–2015
Member of the Graduate Mentoring Award Committee, 2012–2013
President of the SIAM Student Chapter, 2012–2013
Teaching Assistant Coordinator, 2012–2013
Boğaziçi University
Teaching Assistant Coordinator, 2008–2009

Membership in Professional Societies

Member of American Mathematical Society (AMS)
Member of Society of Industrial and Applied Mathematics (SIAM)

- Member of the SIAM Activity Group on Nonlinear Waves and Coherent Structures
- Member of the SIAM Activity Group on Analysis of Partial Differential Equations
- Member of the SIAM Activity Group on Orthogonal Polynomials and Special Functions

Conference and Symposia Organization

Co-organizer, Special Session in the AMS Fall Sect. Meeting, Ann Arbor, MI	October 2018
Organizing Chair, **Inaugural** Chicago Area SIAM Students Conference, Chicago, IL	April 2013
Co-organizer, 8th Nonlinear Dispersive PDE Conference, IMDB, Istanbul, Turkey	August 2008

Teaching

University of Cincinnati

Partial Differential Equations (MATH 7006), 1 section - *Instructor*	Spring 2020
Calculus I (MATH 1061), 1 section - *Instructor*	Spring 2020
Calculus II (MATH 1062), 1 section - *Instructor*	Fall 2019

University of Michigan

Intr. Numerical Methods (MATH 471), 1 section - *Instructor*	Summer 2019
Boundary Value Problems (MATH 454), 1 section - *Instructor*	Spring 2019
Intr. Numerical Methods (MATH 471), 2 sections - *Instructor*	Winter 2019
Honors Calculus I (MATH 185), 2 sections - *Instructor*	Fall 2018
Intr. to Differential Equations (MATH 216), 1 sections - *Instructor*	Spring 2018
Intr. to Differential Equations (MATH 216), 2 sections - *Instructor*	Winter 2018
Intr. to Differential Equations (MATH 216), 2 sections - *Instructor*	Fall 2017
Intr. to Differential Equations (MATH 216), 1 section - *Instructor*	Winter 2017
Calculus I (MATH 115), 2 sections - *Instructor*	Fall 2016
Calculus III (MATH 215), 2 sections - *Instructor*	Winter 2016
Calculus I (MATH 115), 2 sections - *Instructor*	Fall 2015

University of Illinois at Chicago

Emerging Scholars Workshop for Calculus I - *Instructor*	Spring 2015
Research Assistantship (no teaching)	2012–2015
Precalculus (MATH 121) - *Teaching Assistant*	Spring 2012
Calculus I (MATH 180) - *Teaching Assistant*	Fall 2011
Intermediate Algebra Summer Enrichment Workshop (MATH 090 SEW) - *Instructor*	Summer 2011
Intermediate Algebra (MATH 090) - *Teaching Assistant*	Spring 2011
Precalculus (MATH 121) - *Teaching Assistant*	Spring 2010
Beginning Algebra (MATH 075) - *Teaching Assistant*	Fall 2009

Boğaziçi University, Istanbul, Turkey

Calculus I (MATH 101) - *Teaching Assistant*	Summer 2009
Abstract Linear Algebra (MATH 224) - *Teaching Assistant*	Spring 2009
Complex Analysis (MATH 232) - *Teaching Assistant*	Fall 2008
Calculus II (MATH 102) - *Teaching Assistant*	Spring 2008
Matrix Theory (MATH 201) -*Teaching Assistant*	Fall 2007

Schools and Workshops Participated

12. Dispersive Hydrodynamics, Isaac Newton Institute, Cambridge, UK, July 06–26, 2020
11. The Nonlinear Dispersive Partial Differential Equations and Inverse Scattering Workshop, Fields Institute, Toronto, Canada, May 21–25, 2019
10. NSF-CBMS Workshop on Solving Problems in Multiply Connected Domains, Irvine, CA, June 2018

9. Focus Program on Nonlinear Dispersive Partial Differential Equations and Inverse Scattering, Toronto, Canada, August 2017
8. BIRS-CMO Workshop: Geometrical Methods, Non-Self-Adjoint Spectral Problems, and Stability of Periodic Structures, Oaxaca, Mexico, June 2017
7. The Abecedarian of Symmetries and Integrability of Difference Equations Summer School, Université de Montréal, Montréal, Québec, Canada, July 2016
6. Summer School on Random Matrices, University of Michigan, Ann Arbor, MI, June 2016
5. Summer School on Stochastic Analysis and Geometry, University of Illinois at Chicago, Chicago, IL, August 2014
4. Scattering and Inverse Scattering in Multidimensions, University of Kentucky, Lexington, KY, May 2014
3. Recent Advances in PDEs and Fluids Summer School and Workshop, Stanford University, Palo Alto, CA, August 2013
2. CNA Summer School: Topics in Nonlinear PDEs and Calculus of Variations, and Applications in Materials Science, Carnegie Mellon University, Pittsburgh, PA, May 2013
1. Madison Autumn Analysis and PDE Workshop, University of Wisconsin-Madison, Madison, WI, November 2012

Miscellaneous Research Experience

National Center for Data Mining, Chicago, IL Spring 2010
Built a cloud based software for analyzing large genomics datasets and clustering gene candidates based on their protein expression level data
Project Director: Robert L. Grossman

Computer Skills

C, C++, Python, Julia, Mathematica, Matlab, Supercomputing (MPI/OpenMP)